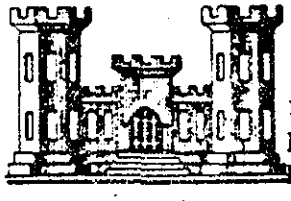
ANDROSCOGGIN RIVER BASIN

MOUNT VERNON , MAINE

FLYING POND DAM
ME-00299

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

APRIL 1979

UNCLASSIFIED

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Androscoggin River Basin
Mount Vernon, Maine

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The dam is a concrete buttress wall structure with an uncontrolled free overfall spillway and a stop log control outlet. The dam is abou 130 ft. long and 7 ft. high. The dam is in good condition. Past structural deficiencies have been repaired. The dam is classified as an intermediate size dam with a low hazard potential.

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ANDROSCOGGIN RIVER BASIN

MOUNT VERNON, MAINE

FLYING POND DAM, Mount ...]

ME-00299

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
ME-00299

FLYING POND DAM
MOUNT VERNON
KENNEBEC COUNTY, MAINE
FLYING POND OUTLET

FIELD INSPECTION, DECEMBER 6, 1978

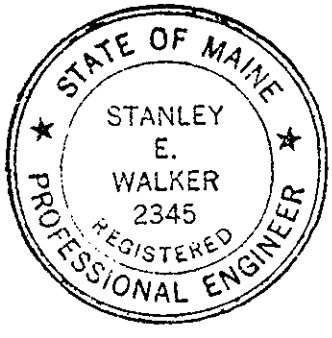
BRIEF ASSESSMENT

The Flying Pond Dam is a concrete buttress wall structure with an uncontrolled free overfall spillway and a stop log control outlet. The dam is about 130 feet long and 7 feet high.

Based on the visual inspection and performance history, the dam is assessed to be in good condition. Past structural deficiencies have been repaired.

Based on the Corps of Engineers guidelines, the dam is classified as an intermediate size dam having low hazard potential. The spillway test flood is one-half the Probable Maximum Flood (PMF) and the routed test flood was estimated to be 5,800 cfs. The spillway capacity without overtopping the dam is only 5 percent of the routed test flood. The routed test flood would overtop the east wingwall of the dam by about 3.2 feet.

The following items of remedial maintenance as outlined in Section 7 should be implemented within 24 months of receipt of this report by the owner: 1) fill, regrade, and protect the embankment adjacent to the west abutment; 2) place cobble and boulder size riprap in the plunge pool below the control outlet discharge channel; 3) remove deteriorated wood timbers and planks located across the stop log bay and replace as necessary to provide access for adjusting stop logs; 4) repair seepage crack at westerly spillway; 5) remove any debris deposited upstream of the stop logs; 6) conduct 24-hour surveillance during heavy runoff periods; and 7) institute a program of biennial periodic technical inspections.



Edward C. Jordan Co., Inc.

Stanley E. Walker, P.E.
Project Officer

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Recommended Guidelines for Safety Inspection of Dams, the spillway test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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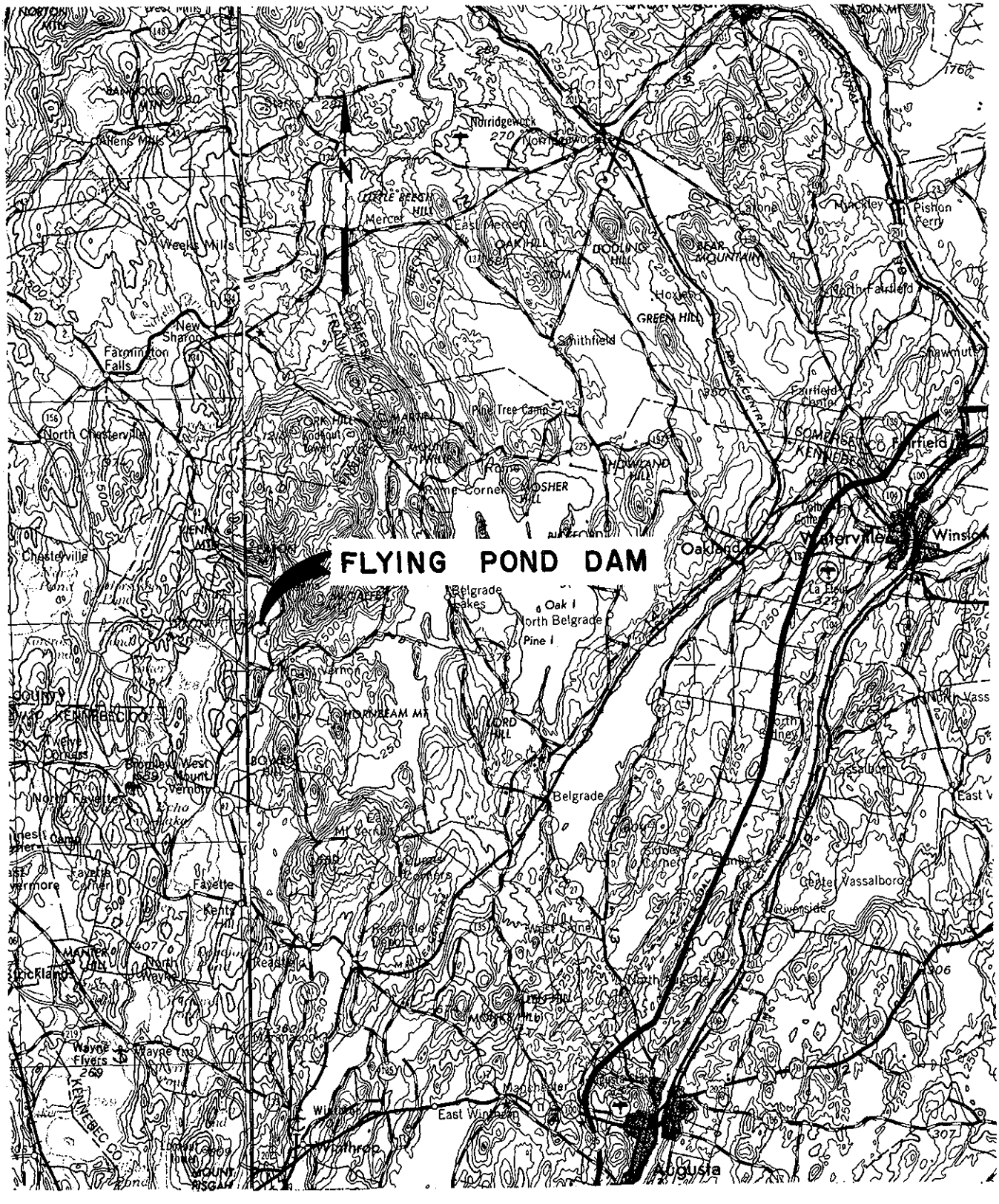

U.S. GEOLOGICAL SURVEY MAP

LEWISTON, ME. QUADRANGLE
NEW HAMPSHIRE, VERMONT QUADRANGLE

0 5 10 15 MILES

EDWARD C. JORDAN CO., INC. PORTLAND, MAINE	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

FLYING POND DAM
LOCATION MAP

FLYING POND OUTLET ME

20799		SCALE	AS SHOWN
		DATE	APRIL 1979

PHASE I INSPECTION REPORT

FLYING POND DAM

SECTION 1

PROJECT INFORMATION

1.1 GENERAL

a. Authority. Public Law 92367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Edward C. Jordan Co., Inc. has been retained by the New England Division to inspect and report on selected dams in the states of Maine and New Hampshire. Authorization and notice to proceed were issued to Edward C. Jordan Co., Inc. under a letter of December 1, 1978 from Max B. Scheider, Colonel, Corps of Engineers. Contract No. DACW3379C0017 has been assigned by the Corps of Engineers for this work.

b. Purpose.

(1) To perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) To encourage and prepare the states to initiate effective dam safety programs for non-Federal dams.

(3) To update, verify and complete the National Inventory of Dams.

1.2 DESCRIPTION OF PROJECT

a. Location. The Flying Pond Dam is located on Dead Stream at the outlet to Flying Pond in the town of Mount Vernon, Maine. N44°-30.9', W69°-59.6'.

b. Description of Dam and Appurtenances. The Flying Pond Dam is a concrete buttress wall structure with an uncontrolled, free overfall spillway and a stop log control outlet. The dam is about 130 feet long and 7 feet high.

c. Size Classification. According to the Corps of Engineers "Recommended Guidelines for Safety Inspection of Dams," Flying Pond Dam is classified as an intermediate size dam based on a maximum storage capacity of 2,450 acre-feet. According to the

guidelines, an intermediate size dam is one with a storage capacity equal to or more than 1000 acre-feet, but less than 50,000 acre-feet or a height equal to or greater than 40 feet, but less than 100 feet.

d. Hazard Classification. The Flying Pond Dam is classified as having a low hazard potential. The peak flow from hypothetical failure of the dam was computed to be 1,200 cfs based on estimating procedures provided by the Corps of Engineers (see Appendix D). At the town of Mount Vernon, located approximately one mile below Flying Pond Dam, the peak flow from dam failure would be about 1,050 cfs. The small dam located just upstream of the town would be capable of discharging the peak flow from failure without flooding in the town. The flow from failure would cause an increase in lake levels of 2 to 3 feet at Minnehonk Lake located immediately downstream of Mount Vernon. The increase in lake levels could result in some minor damage to lake front cabins. No damage would be expected below Lake Minnehonk.

e. Ownership.

Current Owner:	Flying Pond Improvements Association, Inc. (F.P.I.A.) Mount Vernon and Vienna, Maine
Contact Person:	Dr. E.W. Saunders, President - F.P.I.A. Rte. 41 Vienna, Maine Phone: (207) 293-5286
Previous Owners:	Prior to 1952 Millet Grain Mill

f. Operator.

May through October:	Mr. E.P. DeMariano, P.E. Director and Chairman Dam Council Flying Pond Improvement Assoc. Inc. Rt. 41 Mount Vernon, Maine Phone: (207) 293-2142

g. Purpose of Dam. This dam is currently used to maintain the level of Flying Pond for recreational purposes.

h. Design and Construction History. It was reported by the dam operator that the dam was designed by Lawrence Childs (de-

ceased), Mount Vernon, Maine and members of the F.P.I.A., in 1952; and constructed by Lawrence Childs in 1952. He also reported that the 2" x 8" oak plank stop logs were replaced with 2" x 8" steel channel irons in 1970. The dam sustained a breach in the east spillway wall during the winter of 1973-74. In September of 1974 extensive reinforcing of the west spillway and dike walls were performed and in September of 1975 extensive repairs and reinforcing of the east spillway and dike walls were performed.

i. Normal Operating Procedure. Under normal conditions the pond water level is maintained at a height of 56 inches above the floor of the stop log outlet. During low flow conditions stop logs are removed to maintain flow in the stream below the dam.

1.3 PERTINENT DATA

a. Drainage Area. The drainage area above the Flying Pond Dam is about 15.4 square miles. The watershed is primarily forested with elevations ranging from 340 to 1,200 feet (MSL).

b. Discharge at Damsite. Releases at Flying Pond Dam are made through a stop log control outlet at the center of the dam and at the uncontrolled free overfall spillway. The following discharge estimates were made assuming water surface at top of dam (elev. 347.2 ft. MSL) unless otherwise noted.

(1) Spillway capacity - 280 cfs.

(2) Control outlet capacity (top of stop logs at normal water surface elevation of 345.0 ft.) - 105 cfs.

(3) Control outlet capacity with all stop logs in place (top of stop logs at elev. 345.8 ft.) - 53 cfs.

(4) Control outlet capacity (all stop logs removed) - 530 cfs.

(5) Total project discharge at 1/2 PMF - 5,8000 cfs at elev. 350.4 feet.

(6) Maximum flood at damsite is unknown.

c. Elevation. During the field inspection, no physical reference of the dam elevation to mean sea level was readily available. An approximate elevation based on mean sea level was calculated by noting the dam's location on a U.S.G.S. topographic map. The following elevations above mean sea level are approximate only.

Item	Elevation (ft. above MSL)
Streambed at Centerline of Dam	340.5±
Maximum Tailwater	Unknown
Normal Water Surface Elevation (from U.S.G.S. quadrangle)	345.0
Full Flood Control Pool	Not Applicable
1/2 PMF Pool	350.4
Spillway Crest	345.7
Top of Dam - East Wingwall	347.2
- West Wingwall	347.6
Invert of Control Outlet	340.2
Top of Stop Logs with All Stop Logs in Place	345.8

d. Reservoir Reach.

Item	Length (miles)
Normal Water Surface Pool	2.3
Top of Dam (elev. 347.2 ft.)	2.5

e. Reservoir Storage Capacity.

Item	Storage (acre feet)
Normal Water Surface Pool	1,580
Spillway Crest	1,800
Top of Dam (elev. 347.2 ft.)	2,450
1/2 PMF Pool	4,000

f. Reservoir Surface Area.

Item	Surface Area (acres)
Normal Water Surface Pool	400
Spillway Crest	420
Top of Dam (elev. 347.2 ft.)	445
1/2 PMF Pool	500

g. Dam.

Type - The Flying Pond Dam is a concrete buttress wall structure with an uncontrolled, free overfall spillway and a stop log control outlet.

Length - Approximately 130 feet.

Height - Approximately 7 feet (top of dam to centerline of downstream bed).

Top Width - See plan and cross-section sketches in Appendix B-1.

Side Slopes - See plan and cross-section sketches in Appendix B-1.

Zoning - None.

Impervious Core - None.

Cutoff - Cutoff for spillway and dike wall sections is not known.

Grout Curtain - None.

h. Diversion and Regulating Tunnel. Not Applicable.

i. Spillway.

Type - Uncontrolled, free overfall spillway constructed of concrete with vertical downstream face and near-vertical upstream face.

Length - East Section - 27 feet
West Section - 23 feet

Crest Elevation - Approximately 345.7 feet (MSL).

Gates - No control gates are provided on the spillway crest.

Upstream Channel - Flying Pond comprises the approach channel to the spillway (see photo No. 1). This channel is generally clear and unobstructed. The inlet area to the stop log bays is partially clogged with sand bags placed to reduce leakage.

Downstream Channel - The stream channel below the dam is composed of gravel and cobble-sized bed material with low overbank areas. The overbanks are obstructed with many small trees and a light to moderate growth of underbrush (see photo No. 2). The stream flows into an impoundment, formed by a dam in Mount Vernon, within 1,500 feet below Flying Pond Dam. Discharges from the Mount Vernon Dam flow into Minnehonk Lake.

The stream channel immediately below Flying Pond Dam forms a plunge pool which acts as an energy dissipator for discharges from the control outlet. Scour has occurred in this pool to a maximum depth of about 1.5 feet below the invert of the concrete discharge channel.

j. Regulating Outlets.

Invert - Approximately 340.2 feet (MSL).

Size - 5.6 feet high by 10.7 feet wide. This width includes a 1.0 foot wide vertical stop log center support member.

Description - The stop controlled outlet is located near the center of the dam. It is formed by concrete training walls, furnished with manually removable steel channel stop logs (see photo no. 4). The controlled outlet is not accessible during flood flows.

Control Mechanism - There is no mechanical or electrical control mechanism for this outlet.

SECTION 2

ENGINEERING DATA

34

data are available relative to original construction of Pond Dam. No design data are available for repairs made in 1974 and 1975.

ON

ring data are available regarding construction of this

ring data relative to operation of the dam are available.

ibility. No engineering data or plans are available for ying Pond Dam.

icy. The lack of engineering data did not allow for a tive review. Therefore, the adequacy of this dam could assessed from the standpoint of reviewing design and uction data, but is based primarily on visual inspection igineering judgment.

ty. Not applicable.

PHASE I INSPECTION REPORT

FLYING POND DAM

SECTION 1

PROJECT INFORMATION

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i. Normal Operating Procedure. Under normal conditions the pond water level is maintained at a height of 56 inches above the floor of the stop log outlet. During low flow conditions stop logs are removed to maintain flow in the stream below the dam.

1.3 PERTINENT DATA

a. Drainage Area. The drainage area above the Flying Pond Dam is about 15.4 square miles. The watershed is primarily forested with elevations ranging from 340 to 1,200 feet (MSL).

b. Discharge at Damsite. Releases at Flying Pond Dam are made through a stop log control outlet at the center of the dam and at the uncontrolled free overfall spillway. The following discharge estimates were made assuming water surface at top of dam (elev. 347.2 ft. MSL) unless otherwise noted.

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Spillway Crest	345.7
Top of Dam - East Wingwall	347.2
- West Wingwall	347.6
Invert of Control Outlet	340.2
Top of Stop Logs with All Stop Logs in Place	345.8

d. Reservoir Reach.

Item	Length (miles)
Normal Water Surface Pool	2.3
Top of Dam (elev. 347.2 ft.)	2.5

e. Reservoir Storage Capacity.

Item	Storage (acre feet)
Normal Water Surface Pool	1,580
Spillway Crest	1,800
Top of Dam (elev. 347.2 ft.)	2,450
1/2 PMF Pool	4,000

f. Reservoir Surface Area.

Item	Surface Area (acres)
Normal Water Surface Pool	400
Spillway Crest	420
Top of Dam (elev. 347.2 ft.)	445
1/2 PMF Pool	500

g. Dam.

Type - The Flying Pond Dam is a concrete buttress wall structure with an uncontrolled, free overfall spillway and a stop log control outlet.

SECTION 3

VISUAL INSPECTION

3.1 FINDINGS

a. General. The Flying Pond Dam is located at the outlet of Flying Pond. It is about 130 feet long and 7 feet high. The dam closes the stream channel in a broad flat valley section. The land rises only moderately from the abutments for a distance of several hundred feet.

b. Dam.

(1) Structural - The dam is a concrete buttress wall structure. See Appendices A, B, and C for detail inspection notes, sketches and photographs. The inspection resulted in the following major findings.

(a) The concrete dam structure appears generally true to line and grade. The east wing wall has deflected about 2 inches downstream (see photo #5).

(b) The concrete surfaces of the structure are in generally good condition, with little or no spalling or erosion, and only four narrow cracks are evident.

(c) Some erosion of embankment material has occurred adjacent to the westerly abutment where the soil surface is about 3 inches lower than the concrete. Downstream of the abutment only cobbles and boulders remain; the finer soil has been eroded.

(d) Repairs to the spillway and dike walls have been made in two areas in the form of support blocks placed upstream and downstream of the old walls (see Sketch in Appendix B).

(2) Hydraulics - Flying Pond Dam contains a stop log control outlet and an uncontrolled, free overfall spillway. The control outlet is a straight drop, overflow weir with a concrete discharge channel and a plunge pool which act as energy dissipators. The control outlet discharges

directly to the 7-foot long concrete channel which conveys water to the plunge pool. The streambed has been scoured to a depth of about 1.5 feet below the invert of the concrete discharge channel in the plunge pool. However, undermining of the discharge channel was not evident at the time of the field inspection. The inlet area to the stop log bays is partially clogged with sand bags placed to reduce leakage between the individual stop logs. The overflow spillway discharges to the stream channel with energy dissipation being provided by the stream channel and tailwater.

c. Appurtenant Structures. The stop log bays in the central portion of the dam were found to be in good condition. The stop logs and slots are steel. Stop logs must be removed manually since there is no hoisting equipment. The beam above the bay which secures the top of the middle support and the middle support itself are steel.

d. Reservoir Area. The reservoir shoreline is primarily forested with some residences located along the east shore. Ground slopes above high water line are generally flat except along a section of the west shoreline where slopes are moderate to steep. No evidence of recent or potential landslides was observed during the inspection. The approach channel to the spillway is clear and unconstricted.

e. Downstream Channel. The stream channel below the dam is composed of gravel and cobble-sized bed material with low overbank areas. The overbanks are obstructed with many small trees and a light to moderate growth of underbrush. The stream flows into an impoundment, formed by a dam in Mount Vernon, within a distance of 1,500 feet below the Flying Pond Dam. Discharges from Mount Vernon Dam flow into Minnehonk Lake.

The stream channel immediately below Flying Pond Dam forms a plunge pool which acts as an energy dissipator of discharges from the control outlet. Scour has occurred in this pool to a maximum depth of about 1.5 feet below the invert of the concrete discharge channel.

3.2 EVALUATION. Based on the visual inspection the Flying Pond Dam appears to be in good condition. As outlined in Section 7, maintenance is necessary to assure the long-term safety of the structure.

SECTION 4

OPERATING PROCEDURES

4.1 PROCEDURES

Stop logs in the control outlet are operated manually, under the direction of the Flying Pond Improvements Association, to maintain the water surface in Flying Pond 56 inches above the floor of the stop log outlet, under normal flow conditions. During low flow conditions stop logs are removed to maintain flow in the stream below the dam.

4.2 MAINTENANCE OF DAM

Maintenance of the dam is on an as-needed basis. Past structural deficiencies, breach of east spillway and dike walls and cracks in west spillway and dike walls have been repaired.

4.3 MAINTENANCE OF OPERATING FACILITIES

The stop log controlled outlet, including the steel channel stop logs installed in 1970, is in good condition. There appears to be no scheduled maintenance program for the dam.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

There is no formal warning system known to be in effect for this dam.

4.5 EVALUATION

The Flying Pond Dam lacks a routine operation and maintenance program. Records of operation or maintenance activities are kept in the form of minutes of Flying Pond Improvements Association meetings and other informal records. No formal warning system is in effect. As outlined in Section 7 of this report, rehabilitative maintenance is necessary to assure the long-term safety of this dam.

SECTION 5

HYDROLOGIC/HYDRAULIC

5.1 EVALUATION OF FEATURES.

a. General. The Flying Pond Dam is concrete buttress-wall structure with an uncontrolled, free overfall spillway and a stop log control outlet. The dam was constructed to provide control of the lake levels and discharges of Flying Pond. Normal water surface elevation of the pond is about 0.7 feet below spillway crest.

b. Design Data. No original hydrologic or hydraulic design data were available for review.

c. Experience Data. No information regarding past overtopping or other notable hydrologic events was disclosed. According to the dam operator, the spillway is normally used during spring runoff.

d. Visual Observations. Lake levels are primarily controlled by the manipulation of the steel channel stop logs at the control outlet. The control outlet is a straight drop, overflow weir with a concrete discharge channel which conveys water to a plunge pool. Scour has occurred at the bed of the plunge pool to a maximum depth of about 1.5 feet below the invert of the discharge channel. The spillway is an uncontrolled, free overfall type. The overflow spillway discharges to the stream channel with energy dissipation being provided by the stream channel and tailwater.

e. Test Flood Analysis. The Flying Pond Dam is classified as an intermediate size dam having a low downstream hazard potential. According to Corps of Engineers "Recommended Guidelines for Safety Inspection of Dams", the test flood is one-half of the probable maximum flood (1/2 PMF). The drainage area above Flying Pond Dam is about 15.4 square miles and is characterized as flat to rolling. Using the Corps of Engineers' guidance curves for estimating probable maximum discharges, the 1/2 PMF peak inflow to Flying Pond was computed to be 8,300 cfs. The test flood peak outflow routed through Flying Pond was estimated to be 5,800 cfs. The spillway is capable of discharging 280 cfs or 5% of the routed test flood without overtopping the dam. The control outlet at normal operating level can discharge 2% of the routed test flood. The test flood would overtop the east wingwall of the dam (elev. 347.2 ft.) by approximately 3.2 ft. It is noted that at discharges

greater than about 1,500 to 2,000 cfs a high tailwater condition would exist at the dam caused by the backwater effects of the small dam located in the town of Mount Vernon. The potential high tailwater condition at Flying Pond Dam would not cause weir submergence at the dam failure outflow of 1,200 cfs.

f. Dam Failure Analysis. To determine the hazard classification of Flying Pond Dam, the impact of hypothetical failure of the dam at maximum pool was assessed. The failure analysis relied upon the "rule of thumb" guidelines outlined by the Corps of Engineers in an attachment to ETL1100-2-234.

The peak discharge at the dam from failure was estimated to be 1,200 cfs. It would take the reservoir approximately 2 days to empty. Under the conditions of analysis, flow below the dam just prior to failure would be about 330 cfs resulting in an estimated water surface elevation of 343.5 ft. The small timber bridge located about 200 feet below the dam would probably be washed out. A small dam in the Town of Mount Vernon, located approximately 1 mile below Flying Pond Dam, would be capable of discharging the peak flow from failure without significant overtopping. No significant flooding would be expected in the town of Mount Vernon. The peak outflow from the dam at Mount Vernon would be about 1,050 cfs. Lake levels at Minnehonk Lake, located downstream of Mount Vernon, would be raised about 2 to 3 feet. Lake-front dwellings could receive some minor damage due to lake level increases. No damage would be expected below Minnehonk Lake.

SECTION 6

STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY.

a. Visual Observation. Based on the visual observations, the Flying Pond Dam appears to be in good condition. The concrete surfaces of the dam are in good condition. Although there have been structural deficiencies resulting in cracking of the spillway and dike walls, repairs have been made and no distress was evident at the time of inspection. The repairs made are in the form of concrete support blocks placed upstream and downstream of the distress areas.

It was noted during the inspection that erosion has occurred adjacent to the west abutment. This presents a concern from the standpoint that continued erosion could result in a breach of the abutment.

b. Design and Construction Data. No engineering data concerning original design or construction of the Flying Pond Dam was disclosed in this investigation.

c. Operating Records. None available.

d. Post-Construction Changes. Since original construction in 1952, modifications have been made to the spillway and dike walls to add support in areas where distress was occurring. Other changes have included the installation of steel stop logs to replace oak planks and the removing of the fish screen.

e. Seismic Stability. The dam is located in Seismic Zone No. 2 and in accordance with recommended Phase I guidelines, does not warrant seismic analysis.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 DAM ASSESSMENT.

a. Condition. Based on the visual inspection and performance history of the Flying Pond Dam, it is assessed to be in good condition. Structural deficiencies have occurred, however, it appears that adequate repairs have been made. The capacity of the spillway is only about 5% of the 1/2 PMF test flood. During the test flood event the dam would be overtopped by about 3.2 feet.

b. Adequacy of Information. The information available is such that the assessment of the condition of the dam must be based primarily on the visual inspection, the past operational performance of the dam, and engineering judgment.

c. Urgency. The recommendations and remedial measures outlined in 7.2 and 7.3 below should be implemented within 24 months after receipt of this report by the owner.

d. Need for Additional Investigation. Additional investigation is not considered necessary for the current assessment.

7.2 RECOMMENDATIONS

None.

7.3 REMEDIAL MEASURES

a. Operating and Maintenance Procedures. A program of regular inspection and maintenance of the dam should be implemented and recorded. The following specific maintenance and operating procedures should be implemented:

1. The embankment adjacent to the west abutment should be filled, regraded, and protected from further erosion.

2. Place cobble and boulder-size riprap material at the end of outlet discharge channel in the existing plunge pool to minimize further scour.

3. Remove the deteriorated wood timbers and planks across the stop log bay and replace these members as necessary to provide access for adjusting stop logs.

4. Repair seepage crack at westerly spillway.

5. Remove any debris deposited upstream of stop logs.

6. Provide around-the-clock surveillance during periods of anticipated high runoff.

7. Have an inspection of the dam made by a registered professional engineer once every two years.

7.4 ALTERNATIVES

Not applicable.

APPENDIX A

VISUAL INSPECTION CHECKLIST

AND

SUPPLEMENTARY INSPECTION NOTES

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT Flying Pond Dam

DATE 12-6-78

TIME P.M.

WEATHER Sunny Cool

W.S. ELEV. 344.1± U.S. 340.8± DN.S.

PARTY:

1. Stephen Cole
2. John Devine
3. Scott Decker
4. John Kimbal
5. Charles Goodwin

PROJECT FEATURE	INSPECTED BY	REMARKS
1. Geotechnical	Cole	
2. Hydrology/Hydraulics	Devine	
3. Structural	Cole, Devine, Decker	
4. Survey	Kimball, Goodwin	
5. Photograph	Decker, Devine	
6. Civil	Decker	
Review Inspection 1-8-79	Stanley Walker, Charles Horstmann	

No significant differences noted during review inspection.

NOTE: Supplementary inspection notes follow checklist.

PERIOD INSPECTION CHECKLIST

PROJECT Flying Pond Dam DATE 12-6-78

PROJECT FEATURE Embankment NAME Cole

DISCIPLINE Geotechnical NAME

AREA EVALUATED	CONDITION
DIKE EMBANKMENT	Embankment consists only of backfill at abutments
Crest Elevation	347.2 MSL
Current Pool Elevation	344.1± MSL
Maximum Impoundment to Date	Unknown
Surface Cracks	None
Pavement Condition	Turf
Movement or Settlement of Crest	None
Lateral Movement	None
Vertical Alignment	Low at west abutment
Horizontal Alignment	Okay
Condition at Abutment and at Concrete Structures	Okay- east, low and washed at west abutment
Indications of Movement of Structural Items on Slopes	None
Sloughing or Erosion of Slopes or Abutment	Some erosion at west abutment
Rock Slope Protection - Riprap Failures	None
Unusual Movement or Cracking at or Near Toes	None
Unusual Embankment or Downstream Seepage	None
Piping or Boils	None
Foundation Drainage Features	None
Toe Drains	None
Instrumentation System	None

PERIOD INSPECTION CHECKLIST

PROJECT Flying Pond Dam — DATE 12-6-78

PROJECT FEATURE Intake Channel/Struc. — NAME Cole

DISCIPLINE Geotechnical, H/H, Struc. — NAME Devine, Decker

AREA EVALUATED		CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE		
a.	Approach Channel	Cove of Impoundment
	Slope Conditions	Flat
	Bottom Conditions	Gravel, cobbles
	Rock Slides or Falls	None
	Log Boom	None
	Debris	Sandbags and some debris upstream of stop logs
	Condition of Concrete Lining	None
	Drains or Weep Holes	None
b.	Intake Structure	
	Condition of Concrete	Good
	Stop Logs and Slots	Steel stop logs and slots condition good, however, deflection at center occurs easily, vibration also occurs

PERIOD INSPECTION CHECKLIST

PROJECT Flying Pond Dam — DATE 12-6-78

PROJECT FEATURE Control Tower — NAME Cole

DISCIPLINE Structural — NAME Devine, Decker

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	
a. Concrete and Structural	
General Condition	Good
Condition of Joints	Good
Spalling	None
Visible Reinforcing	None
Rusting or Staining of Concrete	None
Any Seepage or Efflorescence	None
Joint Alignment	Good
Unusual Seepage or Leaks in Gate Chamber	N/A
Cracks	None
Rusting or Corrosion of Steel	Minor rusting of stop logs and slots
b. Mechanical and Electrical	
Air Vents	N/A
Float Wells	N/A
Crane Hoist	None - stop logs lifted manually
Elevator	N/A
Hydraulic System	N/A
Service Gates	Stop logs
Emergency Gates	Stop logs
Lightning Protection System	N/A
Emergency Power System	N/A
Wiring and Lighting System in Gate Chamber	N/A

PERIOD INSPECTION CHECKLIST

PROJECT Flying Pond Dam DATE 12-6-78

PROJECT FEATURE Transition & Conduit NAME Cole

DISCIPLINE H/H, Struc., Geotech. NAME Devine, Decker

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	
General Condition of Concrete	Good
Rust or Staining on Concrete	None
Spalling	None
Erosion or Cavitation	None
Cracking	None
Alignment of Monoliths	N/A
Alignment of Joints	Good
Numbering of Monoliths	N/A

PERIOD INSPECTION CHECKLIST

PROJECT Flying Pond Dam — DATE 12-6-78

PROJECT FEATURE Outlet Struc./Chan. — NAME Cole

DISCIPLINE Structural H/H, Geotech. — NAME Devine, Decker

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	
General Condition of Concrete	Good
Rust or Staining	None
Spalling	None
Erosion or Cavitation	None
Visible Reinforcing	None
Any Seepage or Efflorescence	None
Condition at Joints	Good
Drain Holes	None
Channel	
Loose Rock or Trees Overhanging Channel	Trees both sides of channel
Condition of Discharge Channel	Gravel, cobble and boulders
	Deep scour below outlet works apron 1.5' no undermining apparent
	Bridge restriction 200± feet downstream

PERIOD INSPECTION CHECKLIST

PROJECT Flying Pond Dam — DATE 12-6-78

PROJECT FEATURE Spillway — NAME Cole

DISCIPLINE Structural H/H, Geotech. — NAME Devine, Decker

AREA EVALUATED		CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS		
a.	Approach Channel	Cove of impoundment
	General Condition	Good
	Loose Rock Overhanging Channel	None
	Trees Overhanging Channel	None
	Floor of Approach Channel	Gravel and cobbles
b.	Weir and Training Walls	
	General Condition of Concrete	Good - some cracking
	Rust or Staining	Minor lime stain
	Spalling	None
	Any Visible Reinforcing	None
	Any Seepage or Efflorescence	Very minor seepage at crack in west section
	Drain Holes	None
c.	Discharge Channel	
	General Condition	Fair
	Loose Rock Overhanging Channel	None
	Trees Overhanging Channel	Trees both sides of channel
	Floor of Channel	Cobbles, boulders, and gravel
	Other Obstructions	Bridge 200± downstream

PERIOD INSPECTION CHECKLIST

PROJECT Flying Pond Dam — DATE 12-6-78

PROJECT FEATURE Service Bridge — NAME Cole

DISCIPLINE Structural — NAME Devine, Decker

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	No service bridge over spillway to stop log outlet. NOTE, single plank over stop log outlet presents unsafe condition, should be removed.

FLYING POND DAM

APPENDIX A

1. CONCRETE STRUCTURES IN GENERAL

a. Concrete Surfaces

Surfaces of the concrete in Flying Pond Dam were found to be in good condition with little or no visible spalling or erosion and only very few cracks.

b. Structural Cracking

One vertical crack has occurred in the westerly portion of the spillway wall, one crack in the easterly spillway section, and three cracks in the easterly wingwall of the dam. These cracks appear to be due to overstressing of the members. New concrete support members have been placed upstream and downstream in the areas of the cracking and the structural movement appears to have been stopped.

c. Movement, Horizontal and Vertical Alignment

The westerly portion of the dam including the westerly wingwall, spillway, and dike wall and the easterly spillway wall, were all found to be true to line and grade. However, the easterly dike wall of the dam shows evidence of lateral movement in the downstream direction (see photo no. 5). The movement appears to be related to the structural cracking apparently due to overloading, perhaps by ice. The movement is approximately two to three inches.

d. Junctions

The junctions of the dam between the abutments and the wingwall and dike wall and between the wingwall and dike wall and the spillway were found to be in good condition with no evidence of movement or distress.

e. Drains

No drains were found downstream of the dam.

f. Water Passages

The surface of the spillway and the surfaces of the controlled outlet were found to be in good condition with no evidence of erosion, spalling, or leakage (see photos no. 3 and 4).

g. Seepage or Leakage

Very minor leakage was observed at the westerly spillway along a fine crack in the downstream face. No other seepage was observed through or downstream of the structure.

h. Monolith Joints and Construction Joints

The joints of the structure were found to be tight and showed no evidence of movement or distress.

i. Foundation

Based on the visual observation it appears that the dam is founded on a sandy or silty gravel or glacial till soil. No evidence of foundation distress was noted.

j. Abutments

The embankment materials adjacent to the westerly abutment shows signs of erosion. The embankment materials at the upstream edge of the abutment are about two to three inches lower than the concrete surfaces. Downstream along the westerly portion of the abutment it appears that the soil materials have been eroded and there remains only large cobbles and small boulders. No undermining of the abutment, however, was apparent. The easterly abutment consists of stone masonry and concrete. The earth materials adjacent to the easterly abutment appear to be in good condition with no evidence of settlement or erosion.

2. EMBANKMENT STRUCTURES

Not applicable.

3. SPILLWAY STRUCTURES

The spillway of the dam consists of a concrete weir located on each side of the control outlet section.

a. Control Gates and Operating Machinery

The spillway section of the dam is uncontrolled.

b. Unlined Saddle Spillways

None.

c. Approach and Outlet Channels

The approach and outlet channels to the spillway appear clear and unobstructed. The outlet channel has a bed of cobbles and small boulders and has tree growth on both sides. A bridge constricts the channel at a point about 200 feet downstream.

d. Stilling Basin

The stilling basin downstream of the spillway consists of the stream channel which is comprised of boulders and cobbles below the spillway sections. No evidence of serious scour or erosion is evident downstream of the spillway section.

4. OUTLET WORKS

The outlet works consist of two stop log-closed outlet bays.

a. Intake Structure

The intake structure consists of concrete wingwalls onto which the stop log slots are bolted. The inlet appears reasonably clear, however, several sand bags have been placed upstream of the stop logs apparently to minimize leakage through the stop log section. Small pieces of debris have accumulated immedi-

ately upstream of the stop logs and would cause some obstruction to drawdown of the pond.

b. Operating and Control Gates

The stop logs have to be operated manually since there is no hoisting equipment. The stop log slots which consist of steel channels were found to be in good condition and it appears that the stop logs could be removed manually.

c. Conduits, Sluices, and Water Passages

The interior surface of the stop log controlled outlet section was found to be in good condition with no evidence of erosion or spalling of the concrete. No crack or joint leakage was observed.

d. Stilling Basin

Stilling basin immediately downstream of the stop log controlled outlet consists of the concrete discharge channel and a plunge pool below this channel. The floor and sidewalls of the concrete discharge channel were found to be in good condition. Immediately downstream of the concrete discharge channel is a gravel and cobble bedded plunge pool. Scouring to a depth of about 1.5 feet has occurred at the downstream edge of the concrete floor. However, no evidence of undermining of the section was observed.

e. Approach and Outlet Channels

The approach channel to the controlled outlet appears to be clear and unobstructed, however, as noted above several sand bags and some debris exists immediately upstream of the stop logs. The outlet channel is clear and unobstructed, both sides of the channel are lined with trees and a bridge exists approximately 200 feet downstream.

f. Drawdown Facilities

The control outlet structure, which is in good structural and hydraulic condition, is capable of providing drainage of the impounded storage.

5. SAFETY AND PERFORMANCE INSTRUMENTATION

There is no safety or performance instrumentation at the dam.

6. RESERVOIR

a. Shoreline

The Flying Pond reservoir shoreline is primarily forested. There are approximately 40 year-round and summer homes located on the lake. Slopes above high water line are generally flat, except along an area of the west shore where the ground slopes are moderately steep. The potential for slope failure appeared minimal.

b. Sedimentation

The extent of sedimentation in the impoundment could not be observed during the field inspection; however, sediment accumulation does not impede flow to the spillway or control outlet.

c. Potential Upstream Hazard

Some damage would occur to houses located close to the shoreline during the test flood. The residential structure located just west of the dam would be flooded to a depth of approximately 3 feet.

d. Watershed Runoff Potential

Due to the generally good ground cover in the watershed, the flat to rolling terrain, and the lack of lakes and impoundments, the watershed runoff potential is judged to be moderate.

7. DOWNSTREAM CHANNEL

The stream channel below the dam is composed of gravel and cobble-sized bed material with low overbank areas. The overbanks are obstructed with many small trees and a light to moderate growth of underbrush (see photo No. 2). The stream flows into an impoundment, formed by a dam in Mount Vernon, within 1,500 feet below

Flying Pond Dam. Discharges from Mount Vernon Dam flow into Minnehonk Lake.

The stream channel immediately below Flying Pond Dam forms a plunge pool which acts as an energy dissipator of discharges from the control outlet. Scour has occurred in this pool to a maximum depth of 1.5 feet below the invert of the concrete discharge channel.

8. OPERATING AND MAINTENANCE FEATURES

a. Maintenance

It appears that maintenance has been done on the dam on an as needed basis. It was found during the visual inspection that the structure has been maintained in generally good condition, however, it was not determined whether or not a regular program of inspection and maintenance is ongoing.

APPENDIX B

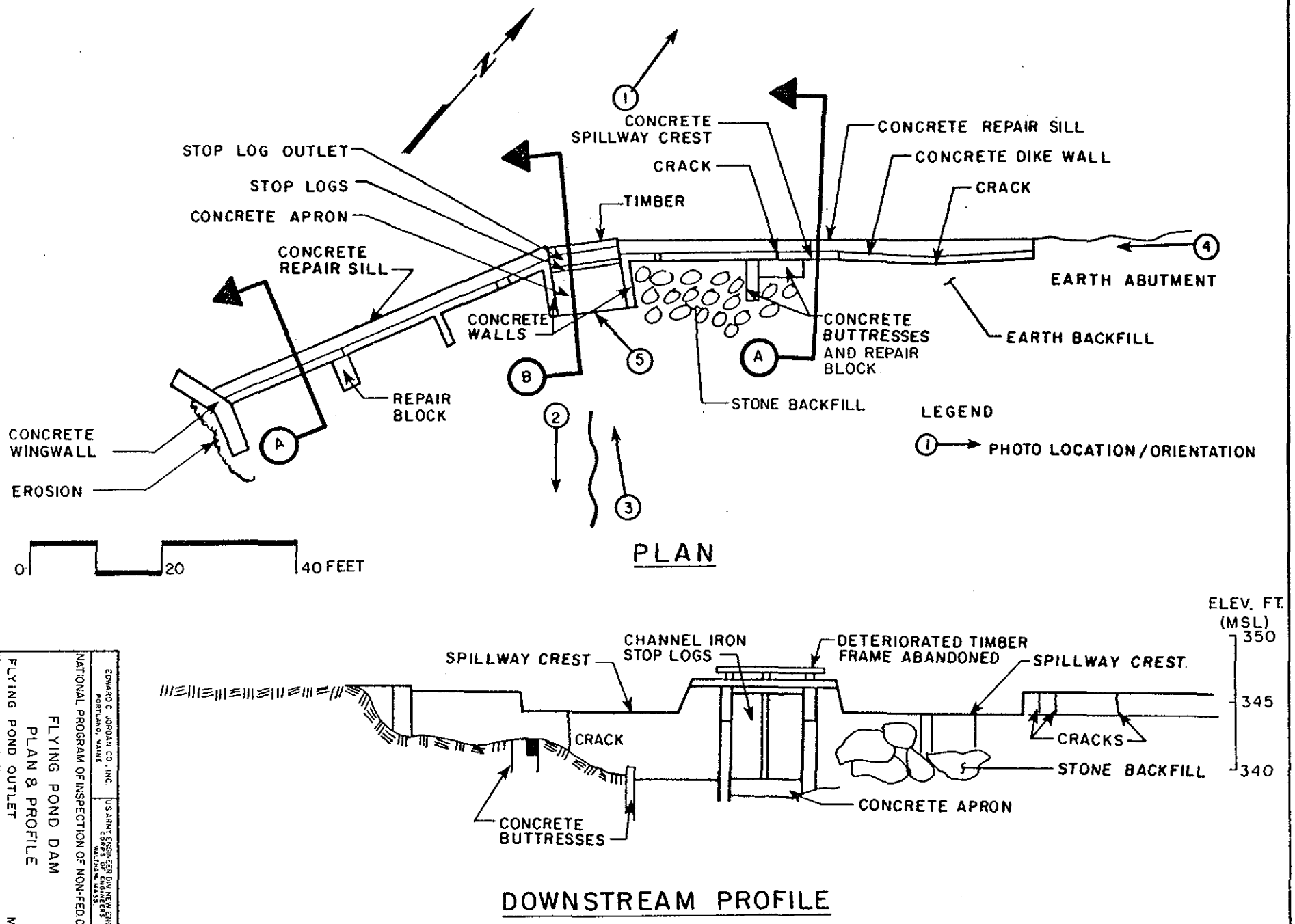
ENGINEERING DATA

This appendix lists the engineering data collected from project records and other sources of data developed as a result of the visual inspection. The contents of this appendix are listed below.

Appendix	Description
B-1	General Project Data

APPENDIX B-1

I. The following plan, profile, and cross-section sketches were developed from a limited stadia survey conducted during the visual inspection, field notes taken by inspection team members and photographs taken during the inspection. The survey was referenced to an arbitrary local datum and subsequently converted to MSL reference by interpolation from U.S.G.S. quadrangle.



NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

EDWARD C. JORDAN CO., INC. PORTLAND, MAINE

U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

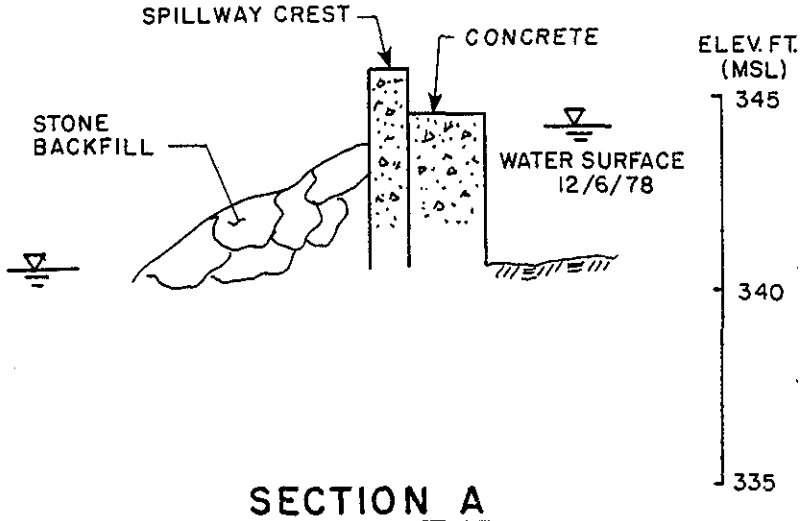
FLYING POND DAM

PLAN & PROFILE

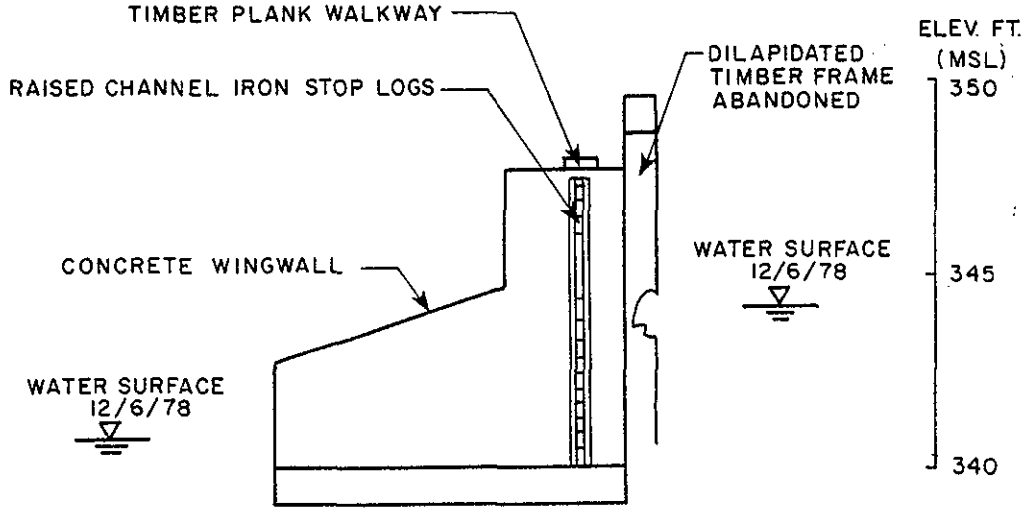
FLYING POND OUTLET ME.

SCALE AS SHOWN

DATE APRIL 1979



SECTION A
(TYPICAL)



SECTION B

EDWARD C. JORDAN CO., INC. PORTLAND, MAINE	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

FLYING POND DAM

CROSS SECTIONS

FLYING POND OUTLET ME.

SCALE AS SHOWN

DATE APRIL 1979

APPENDIX C

PHOTOGRAPHS

The following are photographs referenced in this report. See Plan in Appendix B-1 for photograph locations and orientations.

1
VIEW UPSTREAM

2
VIEW DOWNSTREAM

3
DOWNSTREAM FACE

4
STOP LOGS AT STOP LOG OUTLET

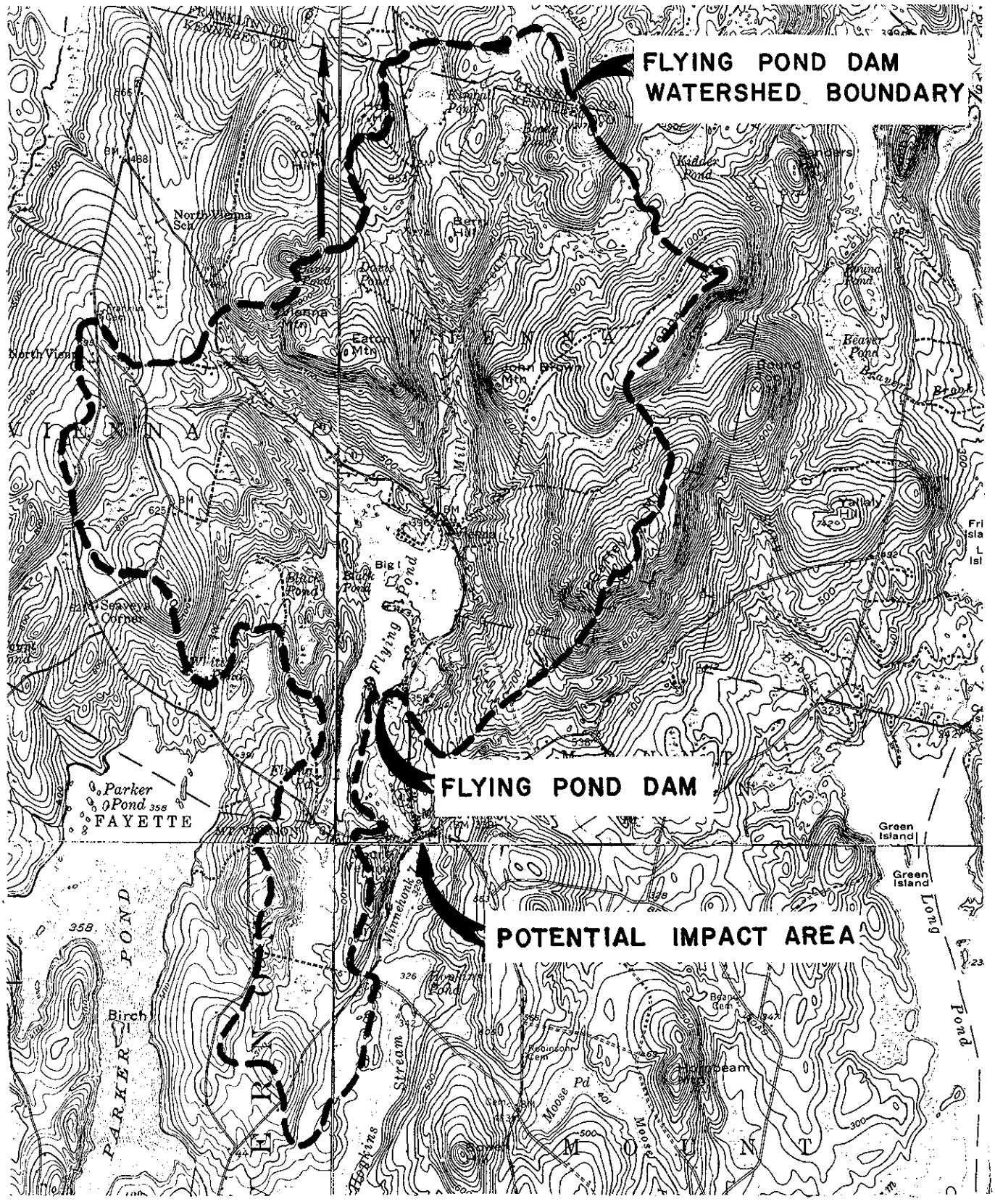
5
VIEW FROM NORTH ABUTMENT

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

Hydrologic computations pertinent to this investigation are attached.

The following figure shows the watershed at the Flying Pond Dam.



U.S. GEOLOGICAL SURVEY MAP
NORRIDGEWOCK, ME. QUADRANGLE
FARMINGTON, ME. QUADRANGLE
AUGUSTA, ME. QUADRANGLE
LIVERMORE, ME. QUADRANGLE

0 1 2 3 MILES

EDWARD C. JORDAN CO., INC. PORTLAND, MAINE	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

FLYING POND DAM
DRAINAGE AREA MAP

FLYING POND OUTLET ME

20799 11 SCALE AS SHOWN
DATE APRIL 1979

PROJECT	COMP BY	JOB NO.
FLYING POND HYDRAULICS	JJD	20799-11
	CHK BY BTB	DATE 2-26-79

DISCHARGE CAPACITY AT DAM

A. UNCONTROLLED OVERFLOW SPILLWAY - CREST ELEV AT 345.7 FT MSL
- BROAD-CRESTED WEIR WITH BREADTH = 1.5 FT

MEAN SEA LEVEL ELEV. (FT)	SURVEY ELEV (FT)	H	C [1]	L	Q
345.7	100.0	0	—	51	0
346.0	100.3	0.3	2.63	51	22
347.0	101.3	1.3	2.89	"	218
347.2	101.5	1.5	3.00	"	281
348.0	102.3	2.3	3.18	"	566
349.0	103.3	3.3	3.32	"	1,015
350.0	104.3	4.3	"	"	1,510
351.0	105.3	5.3	"	"	2,066
352.0	106.3	6.3	"	"	2,677
353.0	107.3	7.3	"	"	3,339

[1] C VALUES FROM KING & BRATER, "HANDBOOK OF HYDRAULICS", 6th EDITION, TABLE 5-3.

B. EAST WINGWALL — CREST ELEVATION AT 347.2 FT MSL

MSL ELEV (FT)	SURVEY ELEV (FT)	H	C [1]	L	Q
347.2	101.5	0	—	29	0
348.0	102.3	0.8	2.64	29	55
349.0	103.3	1.8	"	"	185
350.0	104.3	2.8	"	"	359
351.0	105.3	3.8	"	"	567
352.0	106.3	4.8	"	"	805
353.0	107.3	5.8	"	"	1,069

[1] ASSUMING BREADTH = 10 FT INCLUDING BACKFILL MATERIAL

PROJECT	COMP BY	JOB NO.
FLYING POND HYDRAULICS	JJD	20799-11
	CHK BY BTB	DATE 2-26-79

C. WEST WINGWALL – CREST ELEV AT 347.3 FT MSL
BREADTH WIDTH = 1.5 FT

MSL ELEV	SURVEY ELEV	H	C [1]	L	Q
347.3	101.6	0	–	18	0
348.0	102.3	0.7	2.66	"	28
349.0	103.3	1.7	3.07	"	122
350.0	104.3	2.7	3.31	"	264
351.0	105.3	3.7	3.32	"	425
352.0	106.3	4.7	"	"	609
353.0	107.3	5.7	"	"	813

D. WEST WINGWALL – CREST ELEV AT 347.6 FT MSL
BREADTH WIDTH = 1.5 FT

MSL ELEV (FT)	SURVEY ELEV (FT)	H	C	L	Q
347.6	101.9	0	–	9	0
348.0	102.3	0.4	2.64	9	6
349.0	103.3	1.4	2.92	"	44
350.0	104.3	2.4	3.23	"	110
351.0	105.3	3.4	3.32	"	187
352.0	106.3	4.4	"	"	276
353.0	107.3	5.4	"	"	375

E. CONTROL OUTLET – CREST ELEV OF CONCRETE CHANNEL 339.7 FT MSL
NORMAL WATER SURFACE ELEV 345.0 FT
MAX. WAT. SURFACE ELEV 345.8 FT

MSL ELEV	SURVEY ELEV	H			C			L	Q		
		1	2	3	1	2	3		1	2	3
339.7	94.0	0	–	–	2.64	3.32	3.32	9.7			
342.0		2.3	–	–	2.64	3.32	"	"	89		
345.8		6.1	0.8	0	"	3.32	"	"	385	23	
347.2	101.5	7.5	2.2	1.4	"	3.32	"	"	526	105	53
350.0	[illegible]	10.3	5.0	4.2	"	"	"	"	847	360	277
353.0	107.3	13.3	8.0	7.2	"	"	"	"	1,242	728	622

(1) – ALL STOP LOGS REMOVED (2) – TOP OF STOP LOGS AT 345.0 (3) – TOP OF STOP LOGS AT 345.8

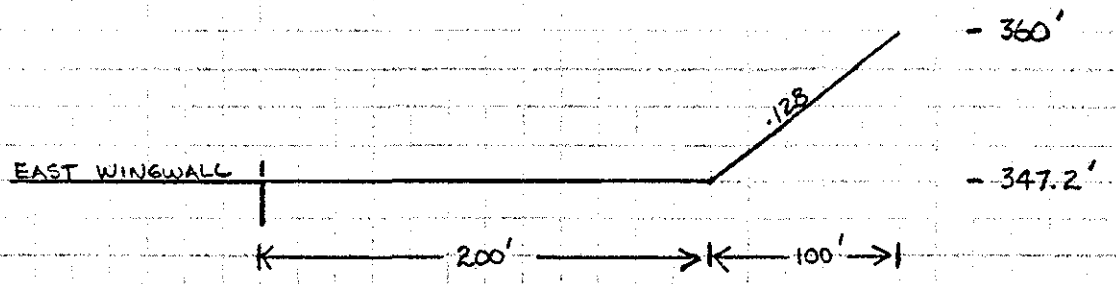
PROJECT	COMP BY	JOB NO.
FLYING POND DAM HYDRAULICS	JJD	20799-11
	CHK BY BTB	DATE 2-27-79

F. TOP OF DAM AT ELEV 347.2 FT MSL (11 FOOT SECTION AT CONTROL OUTLET)
(BREADTH = 1.5 FT)

MSL ELEV	SURVEY ELEV	H	C	L	Q
347.2	101.5				
348.0	102.3	0.8	2.68	11	21
349.0	103.3	1.8	3.07	11	82
350.0	104.3	2.8	3.30	"	170
351.0	105.3	3.8	3.32	"	270
352.0	106.3	4.8	"	"	384
353.0	107.3	5.8	"	"	510

PROJECT	COMP BY	JOB NO.
FLYING POND DAM	JJD	20799-11
OVERLAND FLOW	CHK BY BTB	DATE 2-27-79

(1). EAST BANK OVERLAND FLOW

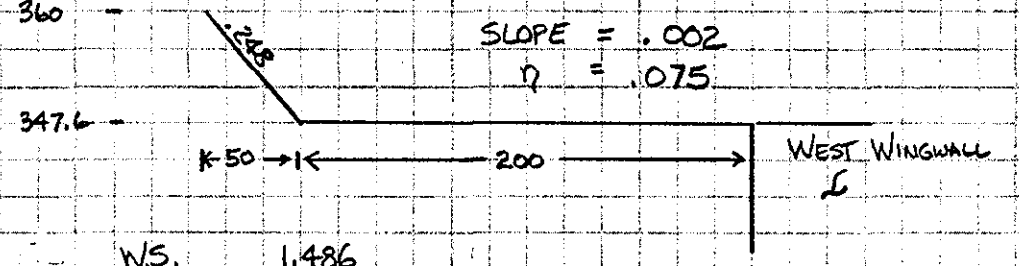


SLOPE = 11/5500 = .002

η = .075 OBSTRUCTED BY SMALL TREES, SOME UNDERBRUSH

W.S. ELEV.	1.486 η	A	P	R	S	Q
347.2	19.8					
348.0	"	163	206	0.79	.002	124
349.0	"	373	214	1.74	"	477
350.0	"	591	222	2.66	"	999
352.0	"	1,050	238	4.41		2,476
353.0	"	1,291	246	5.25		3,414

(2) WEST BANK OVERLAND FLOW

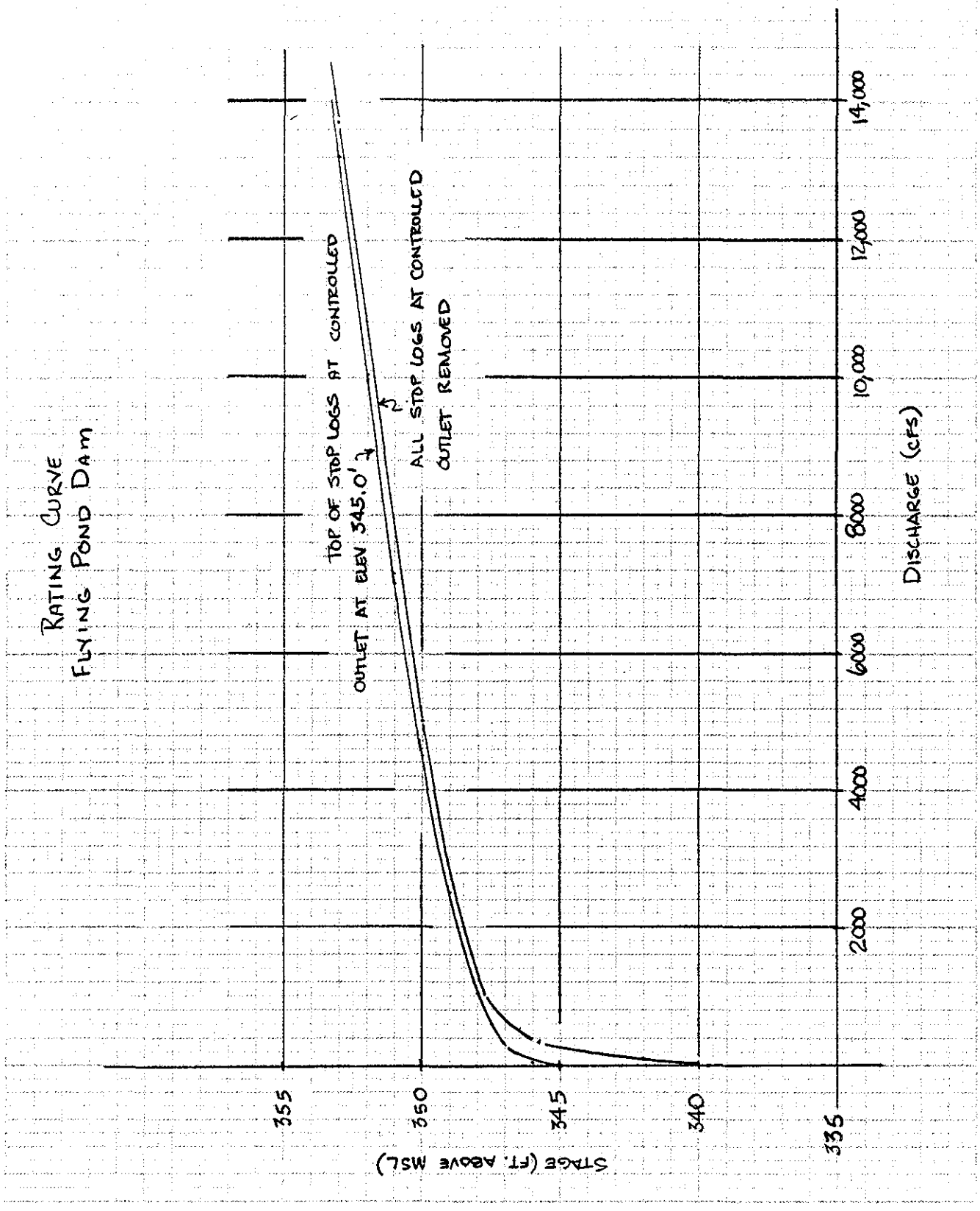


SLOPE = .002

η = .075

W.S. ELEV.	1.486 η	A	P	R	S	Q
347.6	19.8					
348.0	"	80	202	0.40	.002	38
349.0	"	284	206	1.38	"	310
350.0	"	491	210	2.34	"	762
352.0	"	919	218	4.21	"	2,101
353.0	"	1,139	222	5.13	"	2,996

PROJECT	COMP. BY	JOB NO.
FLYING POND DAM	JJD	20799-11
HYDRAULICS	CHK. BY BTB	DATE 4-16-79



PROJECT	COMP. BY	JOB NO.
FLYING POND DAM AREA – CAPACITY DATA OF IMPOUNDMENT	JJD	20799-11
	CHK. BY BTB	DATE 4-16-79

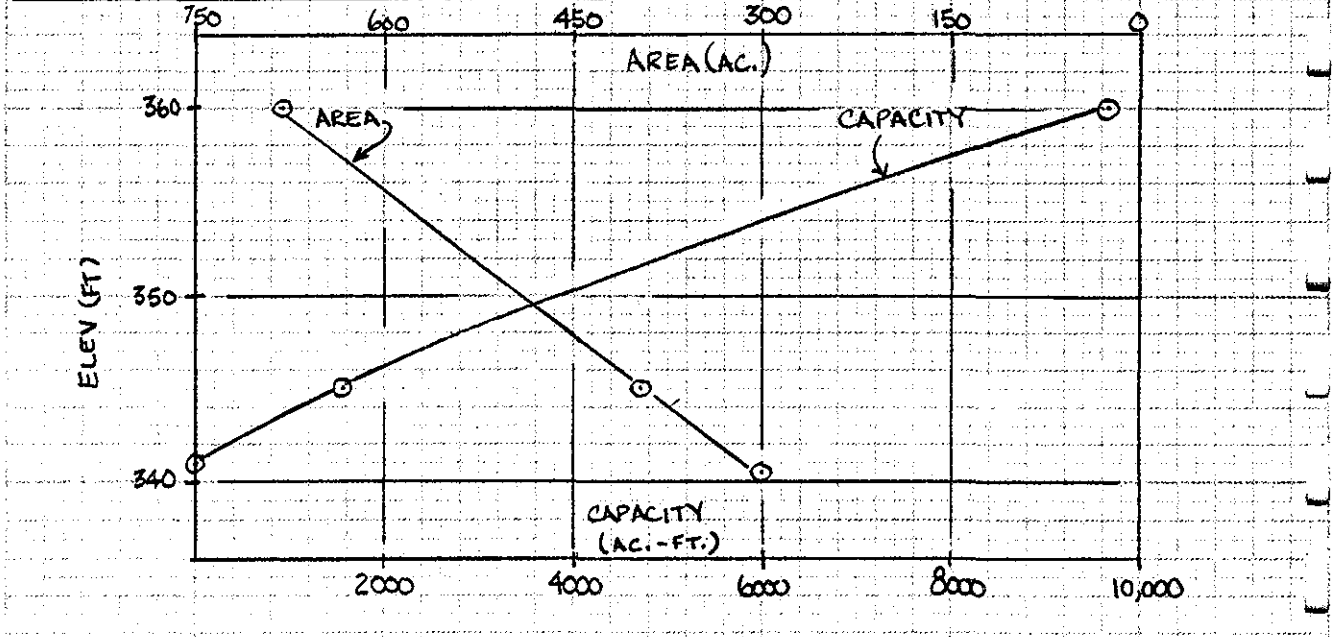
FLYING POND DAM WAS CONSTRUCTED TO RAISE THE WATER LEVEL OF AN EXISTING LAKE AND TO PROVIDE A MEANS OF LAKE LEVEL CONTROL. FROM INFORMATION PROVIDED BY THE MAINE DEPT. OF INLAND FISHERIES, THE ORIGINAL LAKE WAS ESTIMATED TO HAVE A SURFACE AREA 300 ACRES AT ELEV 340.5+. THE AREA-CAPACITY DATA GIVEN BELOW REFERS TO THE IMPOUNDED WATER ONLY

AREA - CAPACITY DATA :

TIE INTO U.S.G.S. MEAN SEA LEVEL ELEV - NORMAL WATER SURFACE ELEV MARK ON DAM (SEE PHOTOS) CORRESPONDS TO ELEV 345 FEET GIVEN ON U.S.G.S. QUADRANGLE, ∴ 99.3 FT (SURVEY) = 345.0 FT (MSL)

ELEV (FT. ABOVE MSL)	AREA (AC)	AVG. AREA (AC)	DEPTH INTERVAL (FT)	Δ VOL (AC.-FT.)	VOL (AC-FT)
340.5	300				0 1/
		350	4.5	1,575	
345.0	400				1,575
		540	15.0	8,100	
360.0	680				9,675

1/ IMPOUNDED VOLUME = 0 AC-FT



PROJECT	COMP BY	JOB NO.
FLYING POND DAM TEST FLOOD ANALYSIS	JJD	20799-11
	CHK BY BTB	DATE 2-27-79

TEST FLOOD ANALYSIS

DRAINAGE AREA - 15.4 SQUARE MILES
SIZE CLASSIFICATION - INTERMEDIATE
HAZARD CLASSIFICATION - LOW HAZARD POTENTIAL
DESCRIPTION - FLAT TO ROLLING
TEST FLOOD - 1/2 PMF (THERE IS LITTLE UPSTREAM STORAGE)

PMF PEAK FLOW RATE - 1,080 CFS/SQ. MI. (USING A CURVE MID-WAY BETWEEN FLAT AND ROLLING)
1/2 PMF PEAK FLOW RATE - 540 CFS/SQ. MI.

∴ 1/2 PMF PEAK FLOW RATE = 8,300 CFS

ELEVATION - DISCHARGE - STORAGE DATA

MEAN SEA LEVEL ELEV (FT)	DISCHARGE CAPACITY OF DAM 1/ (CFS)	SURCHARGE STORAGE OF RES. (AC.-FT.)
345.7	20	0 2/
346.0	54	100
347.0	309	550
348.0	1,022	1000
349.0	2,492	1500
350.0	4,534	2,050
351.0	7,088	2500
352.0	9,924	3100
TOP OF EAST WINGWALL - 347.2	334	650

1/ CONTROL OUTLET STOP LOGS AT ELEV 345.0 FT, ACCORDING TO THE DAM OPERATOR; THIS IS THE ELEV. MAINTAINED DURING HURRICANE SEASON

2/ STORAGE CAPACITY AT SPILLWAY CREST = 1,800 AC-FT

PROJECT	COMP BY	JOB NO.
FLYING POND DAM	JJD	20799-11
TEST FLOOD ANALYSIS – EFFECT OF SURCHARGE STORAGE	CHK BY BTB	DATE 2-28-79

½ PMF PEAK INFLOW = 8,300 CFS

SURCHARGE HEIGHT TO PASS ½ PMF = 5.7 FT (351.4 FT MSL)
VOLUME OF SURCHARGE :

$$STOR_1 = 2{,}740 \text{ A-F} \times \frac{1}{15.4 \text{ MI}^2} \times \frac{1}{640} \times \frac{12}{1} = 3.37 \text{ INCHES}$$

$$Q_{p2} = Q_{p1}\left(1 - \frac{STOR_1}{9.5}\right)$$

$$= 8{,}300\left(1 - \frac{3.37}{9.5}\right) = 5{,}385 \text{ CFS}$$

SURCHARGE HEIGHT TO PASS Q_{p2} = 4.6 FT (350.3 FT MSL)
VOL. OF SURCHARGE :

$$STOR_2 = \frac{2200 \text{ A-F}}{15.4} \times \frac{12}{640} = 2.68 \text{ IN}$$

$$STOR_{AVE} = \frac{STOR_1 + STOR_2}{2} = 3.02 \text{ IN.}$$

$$Q_{p3} = 8300\left(1 - \frac{3.02}{9.5}\right) = 5{,}658 \text{ CFS}$$

SURCHARGE HEIGHT TO PASS Q_{p3} = 4.7 FT (350.4 FT MSL)

TEST FLOOD OVERTOPS EAST WINGWALL (EL 347.2) BY 3.2 FEET

SPILLWAY CAN DISCHARGE 57% OF TEST FLOOD

SPILLWAY + $^{MAX.}/_{}$CAPACITY OF CONTROL OUTLET IS 807 CFS OR 14% OF ½ PMF PEAK OUTFLOW

AT DISCHARGES GREATER THAN ABOUT 2,000 CFS, VERY HIGH TAILWATER CONDITIONS WILL OCCUR AT THE DAM DUE TO BACKWATER EFFECTS OF THE DOWNSTREAM DAM IN MOUNT VERNON.

PROJECT	COMP BY	JOB NO.
FLYING POND	JJD	20799-11
DAM FAILURE ANALYSIS	CHK BY BTB	DATE 2-27-79

DAM FAILURE ANALYSIS

WATER SURFACE ELEVATION AT TOP OF EAST WINGWALL (ELEV 347.2 FT)

(1) STORAGE AT TIME OF FAILURE = 2,450 ACRE-FEET

(2) FAILURE OUTFLOW

$$Q = \frac{8}{27} W_b \sqrt{G}\, Y_o^{3/2}$$

$Y_o = 347.2 - 340.5 = 6.7$ FT

W_b = 40% OF DAM LENGTH AT MID-HEIGHT
= .4(75 FT)
= 30 FT

$$Q = \frac{8}{27}(30)\sqrt{G}\,(6.7^{3/2})$$

= 875 CFS

(3) FLOW JUST PRIOR TO FAILURE

A) SPILLWAY - 281 CFS

B) CONTROL OUTLET - 53 CFS (TOP OF STOP LOGS AT ELEV 345.8)

C) TOTAL = 334 CFS

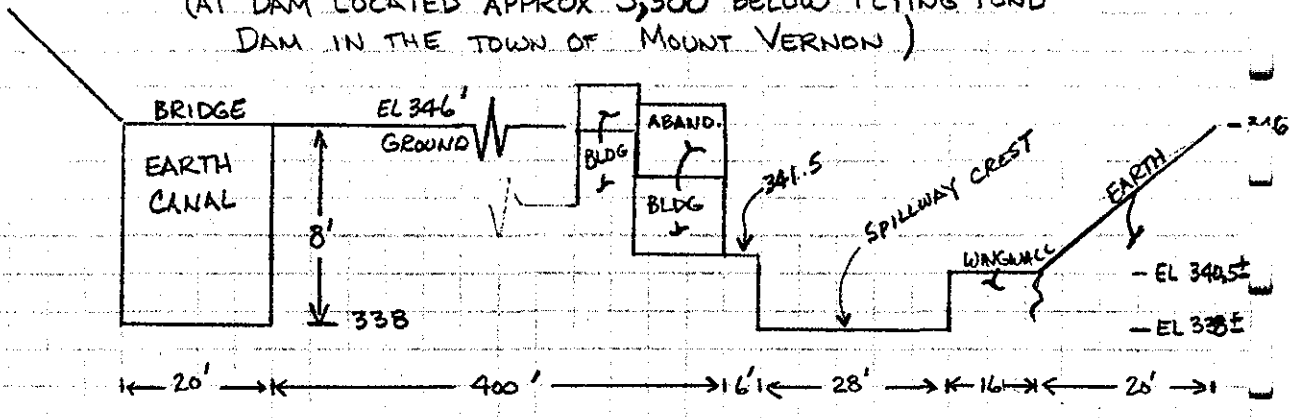
(4) PEAK OUTFLOW FROM FAILURE = 1,209 cfs $\cong$ 1,200 cfs

(5) TIME FOR RESERVOIR TO EMPTY, T

$$T = \frac{12.1\,S}{1/2\,Q_{p1}} = \frac{12.1\,(2300)}{1/2\,(1200)} = 46 \text{ HOURS}$$

PROJECT	COMP BY	JOB NO.
FLYING POND DAM DAM FAILURE ANALYSIS	JJD	20799-11
	CHK BY BTB	DATE 2-27-79

CROSS-SECTION #1
(AT DAM LOCATED APPROX 5,300 BELOW FLYING POND DAM IN THE TOWN OF MOUNT VERNON)



RATING CURVE FOR DOWNSTREAM DAM:
A) FOR SPILLWAY AND WINGWALL DISCHARGE, "C" = 2.6 ($Q = CLH^{3/2}$)
B) FOR CANAL DISCHARGE, S = 9/600 = .015 AND
n = .050 (VERY ROCKY, SOME BRUSH)

W.S. ELEV.	SPILLWAY Q	CANAL Q	TOTAL Q
339	73	68	141
340	206	204	410
341	378	379	757
342	582	582	1,164
343	814	1,806	1,620

STORAGE AT TIME OF FAILURE = 2,450 AC.-FT.
Q_{p1} = 1,200 CFS TRIAL ELEV. = 342.1 FT (STAGE = 4.1 FT)
V_1 = 75 ACRES × 3.5 FT = 263 AC-FT
(BASED ON STORAGE AREA × AVG. DEPTH FOR MT. VERNON DAM IMPOUNDMENT AT ELEV 342.1 FT)

$$q_{p2} = 1{,}200\left(1 - \frac{263}{2450}\right) = 1{,}071$$

$V_2 \cong$ 250 AC-FT
V_{AVG} = 257 AC-FT

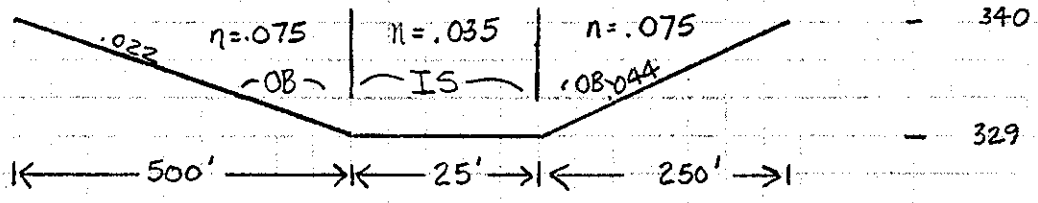
$$Q_1 = 1{,}200\left(1 - \frac{257}{2450}\right) = 1{,}074 \text{ CFS} \quad \text{STAGE} = 341.8 \text{ FT}$$

NO DAMAGE IN TOWN OF MOUNT VERNON

PROJECT	COMP BY	JOB NO.
FLYING POND DAM DAM FAILURE ANALYSIS	JJD	20799-11
	CHK BY BTB	DATE 2-27-79

CROSS-SECTION #2
OUTLET OF MINNEHONK LAKE, ABOUT 2 MILES BELOW DAM

SLOPE = 3/600 = .005



ASSUME OUTLET FLOW IS GOVERNED BY MANNINGS EQUATION

W.S. ELEV (FT)	1.486/n IS	1.486/n OB	A IS	A OB	P IS	P OB	R IS	R OB	S	Q IS	Q OB	Q T
331	42.5	19.8	50	136	25	136	2	1.00	.005	238	190	428
332	"	"	75	307	25	204	3	1.50	"	468	563	1,031
333	"	"	100	545	25	273	4	2.00	"	756	1,204	1,960
334	"	"	125	1,227	25	341	5		"	1,087		
335	"	"							"			

AREA - CAPACITY DATA FOR SURCHARGE STORAGE : MINNEHONK LAKE

	W.S.E	Area (AC)	Avg Area	Depth	ΔVol	Vol (AC-FT)
NORMAL LAKE LEVEL	329	83				0 (SURCHARGE STOR.)
			119	11	1,309	
	340	155				1,309

STORAGE AT TIME OF FAILURE = 2,450

Q_1 = 1,074 TRIAL STAGE = 3.0 FT

V_1 = 357 AC-FT

$q_{2p} = 1{,}074\left(1 - \frac{357}{2450}\right) = 917$ CFS

V_2 = 331 AC-FT , V_{AVE} = 344 AC-FT

$Q_2 = 1{,}074\left(1 - \frac{344}{2450}\right) = 923$ CFS LAKE LEVELS RAISED ~2.8 FT

APPENDIX E

Information as Contained in National Inventory of Dams